


The colours of indicators in acidic and basic solutions

Indicator	Colour on acid side	pH at colour change	Colour on basic side
methyl orange	red	3–5	yellow
litmus	red	5–8	blue
phenolphthalein	colourless	8–10	pink

Two Activity Series		
Metals	Decreasing Activity	Halogens
lithium potassium calcium sodium magnesium aluminum zinc chromium iron nickel tin lead HYDROGEN* copper mercury silver platinum gold		fluorine chlorine bromine iodine

Mono	1	I
Di	2	II
Tri	3	III
Tetra	4	IV
Penta	5	V
Hexa	6	VI
Hepta	7	VII
Octa	8	VIII

Elements that get a subscript of 2: H O F Br I N Cl

Synthesis :
A + B -> AB

Decomposition
AB-> A + B

Single Displacement
A + BC -> AC + B (If A is a metal)
-> BA + C (If A is a non metal)

Double Displacement
AB + CD -> AD + CB

Equations

Mirror/Thin Lens Equation

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

Magnification Equation

$$m = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

Index of Refraction

$$n = \frac{c}{v} \qquad c = 3.00 \times 10^8 \text{ m/s}$$

Substance	Index of Refraction, n
vacuum	1.0000
air	1.0003
ice	1.31
water	1.33
ethanol	1.37
glycerin	1.47
fused quartz glass	1.47
crown glass	1.52
Lucite or Plexiglas	1.52
light flint glass	1.58
ruby	1.54
zircon	1.92
diamond	2.42

PERIODIC TABLE OF IONS

TABLE OF POLYATOMIC IONS																	
acetate			CH ₃ COO ⁻			TABLE OF POLYATOMIC IONS											
arsenate			AsO ₄ ³⁻			dihydrogen phosphate			H ₂ PO ₄ ⁻			oxalate			C ₂ O ₄ ²⁻		
arsenite			AsO ₃ ³⁻			hydrogen carbonate			HCO ₃ ⁻			perchlorate			ClO ₄ ⁻		
benzoate			C ₆ H ₅ COO ⁻			hydrogen oxalate			HC ₂ O ₄ ⁻			permanganate			MnO ₄ ⁻		
borate			BO ₃ ³⁻			hydrogen sulfate			HSO ₄ ⁻			peroxide			O ₂ ²⁻		
bromate			BrO ₃ ⁻			hydrogen sulfide			HS ⁻			phosphate			PO ₄ ³⁻		
carbonate			CO ₃ ²⁻			hydrogen sulfite			HSO ₃ ⁻			pyrophosphate			P ₂ O ₇ ⁴⁻		
chlorate			ClO ₃ ⁻			hydroxide			OH ⁻			sulfate			SO ₄ ²⁻		
chloride			Cl ⁻			hypochlorite			ClO ⁻			sulfite			SO ₃ ²⁻		
chlorite			ClO ₂ ⁻			iodate			IO ₃ ⁻			thiocyanate			SCN ⁻		
chromate			CrO ₄ ²⁻			monohydrogen phosphate			HPO ₄ ²⁻			thiosulfate			S ₂ O ₃ ²⁻		
cyanate			CNO ⁻			nitrate			NO ₃ ⁻			POSITIVE POLYATOMIC IONS					
cyanide			CN ⁻			nitrite			NO ₂ ⁻			ammonium			NH ₄ ⁺		
dichromate			Cr ₂ O ₇ ²⁻			orthosilicate			SiO ₄ ⁴⁻			hydronium			H ₃ O ⁺		

1	2	3	4	5	6	7	8	9	10	11	12
hydrogen											
H ⁺											
lithium											
Li ⁺											
beryllium											
Be ²⁺											
sodium											
Na ⁺											
magnesium											
Mg ²⁺											
potassium											
K ⁺											
calcium											
Ca ²⁺											
scandium											
Sc ³⁺											
titanium											
Ti ⁴⁺											
vanadium											
V ⁵⁺											
chromium											
Cr ²⁺											
manganese											
Mn ⁴⁺											
iron											
Fe ²⁺											
cobalt											
Co ³⁺											
nickel											
Ni ³⁺											
copper											
Cu ⁺											
zinc											
Zn ²⁺											
gallium											
Ga ³⁺											
germanium											
Ge ⁴⁺											
arsenic											
As ³⁻											
selenium											
Se ²⁻											
bromine											
Br ⁻											
krypton											
Kr											
rubidium											
Rb ⁺											
strontium											
Sr ²⁺											
yttrium											
Y ³⁺											
zirconium											
Zr ⁴⁺											
niobium											
Nb ⁵⁺											
niobium(V)											
niobium(V)											
Nb ³⁺											
molybdenum											
Mo ⁶⁺											
technetium											
Tc ⁷⁺											
ruthenium											
Ru ³⁺											
rhodium											
Rh ³⁺											
rhodium(IV)											
Ru ⁴⁺											
osmium											
Os ⁴⁺											
iridium											
Ir ⁴⁺											
osmium											
Os ⁷⁺											
rhenium											
Re ⁷⁺											
tungsten											
W ⁶⁺											
tantalum											
Ta ⁵⁺											
tantalum											
Ta ³⁺											
hafnium											
Hf ⁴⁺											
lanthanum											
La ³⁺											
actinium											
Ac ³⁺											

58	59	60	61	62	63	64	65
cerium	praseodymium	neodymium	promethium	samarium	europium	gadolinium	terbium
Ce ³⁺	Pr ³⁺	Nd ³⁺	Pm ³⁺	Sm ³⁺	Eu ³⁺	Gd ³⁺	Tb ³⁺
thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium
Th ⁴⁺	Pa ⁵⁺	U ⁶⁺	Np ⁵⁺	Pu ⁴⁺	Am ³⁺	Cm ³⁺	Bk ³⁺
	protactinium(V)	uranium(VI)	neptunium(VI)	plutonium(IV)	americium(III)	curium(III)	berkelium(III)
	Pa ⁴⁺	U ⁴⁺	Np ⁴⁺	Pu ⁶⁺	Am ⁴⁺	Cm ⁴⁺	Bk ⁴⁺
	protactinium(IV)	uranium(IV)	neptunium(IV)	plutonium(VI)	americium(IV)	curium(IV)	berkelium(VI)

87	88	89
francium	radium	actinium
Fr ⁺	Ra ²⁺	Ac ³⁺